

**TRANSLATION**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>R 44361</b>	<b>FOR FURTHER ACTION</b>	See Form PCT/IPEA/416
International application No. <b>PCT/AT2004/000336</b>	International filing date ( <i>day/month/year</i> ) <b>04.10.2004</b>	Priority date ( <i>day/month/year</i> ) <b>13.11.2003</b>
International Patent Classification (IPC) or national classification and IPC  <b>H01 S3/098, H01 S3/081</b>		
Applicant <b>FEMTOLASERS PRODUKTIONS GMBH</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of <u>8</u> sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising: a. <input type="checkbox"/> ( <i>sent to the applicant and to the International Bureau</i> ) a total of _____ sheets, as follows: <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> ( <i>sent to the International Bureau only</i> ) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AT2004/000336

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-13 as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- nos. 1-11 as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the drawings:
- sheets 1/4-4/4 as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	1-11	YES
	Claims		NO
Inventive step (IS)	Claims	2, 3	YES
	Claims	1, 4-11	NO
Industrial applicability (IA)	Claims	1-11	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
<p>1. The present report refers to the following documents:</p> <p>D1: CHO S H ET AL: "GENERATION OF 90-NJ PULSES WITH A 4-MHZ REPETITION-RATE KERR-LENS MODE-LOCKED Ti:AL<sub>2</sub>O<sub>3</sub> LASER OPERATING WITH NET POSITIVE AND NEGATIVE INTRACAVITY DISPERSION" OPTICS LETTERS, OPTICAL SOCIETY OF AMERICA, WASHINGTON, US, Vol. 26, No. 8, 15 April 2001 (2001-04-15), pages 560-562, XP001077217 ISSN: 0146-9592</p> <p>D2: US 5 734 503 A (KRAUSZ FERENC ET AL) 31 March 1998 (1998-03-31).</p> <p>2. In the letter of 17 August 2005 the applicant put forward arguments in favour of an inventive step of the subject matter of the application. However, these arguments relate to a resonator having a relatively small positive mean dispersion as defined in, for example, dependent <u>claims 2 and 3</u> (see paragraph 5 below). However, the subject matter of <u>claim 1</u> refers to a resonator with a positive mean dispersion. A resonator of this kind is already known from document D1 (see paragraph</p>			

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	<p>3.1 below). The arguments proposed in the present international preliminary report on patentability are therefore the same as those already put forward by the Examining Authority in its written opinion of 9 December 2004.</p> <p>The applicant's attention is drawn to the fact that the written report of the International Searching Authority is considered the first Chapter II written opinion of the International Preliminary Examining Authority.</p> <p>3. The present application does not meet the requirements of <b>PCT Article 33(1)</b> because the subject matter of <u>claims 1 and 11</u> does not involve an inventive step within the meaning of <b>PCT Article 33(3)</b>.</p> <p>3.1 Document D1 (see page 560, left-hand column, paragraph 1, to page 562, left-hand column, paragraph 3; figure 1) is considered the prior art closest to the subject matter of <u>claim 1</u>. It discloses (the references between parentheses relate to D1) a</p> <p>short-pulse laser device with preferably passive mode coupling (Kerr-lens mode-locked (KLM) Ti:Al<sub>2</sub>O<sub>3</sub> laser), having a</p> <p>resonator (cavity) which contains a laser crystal (Ti: sapphire crystal) and a plurality of mirrors (M1, M2, R1, R2, SBR, OC), of which one forms a pump-stream input-coupling mirror (R1) and a</p>

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	<p>further one a laser-beam output-coupling mirror (OC), having a multi-reflection telescope (MPC) magnifying the resonator length, wherein during operations the resonator (cavity) has a positive mean dispersion in an affected wavelength range (net positive dispersion regime; see page 560, left-hand column, lines 26-30; page 561, right-hand column, lines 7-11; page 562, left-hand column, paragraph 3).</p> <p>The subject matter of <u>claim 1</u> therefore differs from that known from document D1 in that</p> <p>the adjustment of the positive mean dispersion of the resonator is carried out <b>using the resonator mirrors</b>, of which at least a few are in the form of <b>dispersive mirrors</b>.</p> <p>The <b>problem</b> to be solved by the present invention is therefore understood to be that of providing a short-pulse laser device wherein the mean dispersion can be accurately set.</p> <p>The solution proposed in <u>claim 1</u> of the present application cannot be considered inventive, for the following reasons (<b>PCT Article 33(3)</b>):</p> <p>Document D2 (see column 2, line 32, to column 3, line 65) discloses the use of dispersive mirrors for accurately setting the dispersion in the resonator of a femto-second pulse-Ti: sapphire laser and with regard to this feature describes</p>

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	<p>the same advantages as the present application.</p> <p>To a person skilled in the art it would therefore be a <b>routine design measure</b> to incorporate this feature into the short-pulse laser device described in document D1 in order to solve the problem of interest.</p> <p>The solution proposed in independent <u>claim 1</u> therefore cannot be considered inventive (<b>PCT Article 33(3)</b>).</p> <p><u>Observation:</u></p> <p>Document D1 (page 562, left-hand column, paragraph 3) already points out that the use of specially designed chirped mirrors instead of the normally used prisms, can be expected to improve a resonator with a positive mean dispersion.</p> <p>3.2 The subject matter of <u>claim 11</u> does not involve an inventive step, for similar reasons (see also document D1, page 560, left-hand column, lines 35-37).</p> <p>3.3 <u>Observation:</u></p> <p>The documents not cited in the present report, but cited in the international search report, likewise disclose dispersive mirrors for the accurate setting of dispersion in laser resonators (see the corresponding passages cited in the search</p>

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	<p>report) .</p> <p>4. Dependent <u>claims 4-10</u> contain no additional features which, combined with the features of any claim to which they refer, meet the <b>PCT</b> requirements for inventive step. The additional features of <u>claims 4-10</u> instead appear to be routine measures known in the art, which a person skilled in the art would use with the short-pulse laser device of <u>claim 1</u>, depending on the special operating requirements.</p> <p>Consequently, it would be straightforward for a person skilled in the art to arrive at a short-pulse laser device according to <u>claims 4-10</u> by applying general technical knowledge in the field to a short-pulse laser device according to document D1, without thereby exercising inventive skill.</p> <p>5. The combination of features contained in dependent <u>claims 2 and 3</u> is not known from or suggested by the relevant prior art. The reasons are as follows:</p> <p>Document D1 (see page 561, right-hand column, paragraph 1) discloses a <b>positive total dispersion</b> of the resonator of <b>+390 fs<sup>2</sup></b>. However, the prior art <b>offers nothing</b> to suggest choosing the elements of the resonator in such a way that resonator dispersion is situated in the relevant wavelength range of <b>between 0 and 100 fs<sup>2</sup></b>.</p>

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

Consequently, the subject matter of the present  
claims 2 and 3 appears to meet the requirements of  
**PCT Article 33(2) and (3)**.

**Observation:**

The application does not satisfy the requirements of **PCT  
Article 6** because claim 7 is not clear.

Claim 7 refers to a **negative dispersion** short-pulse laser  
device and is therefore inconsistent with the subject  
matter of claim 1, which defines a short-pulse laser  
device having a resonator with a **positive mean dispersion**  
and to which claim 7 indirectly refers back.